

IEEE1394 And Entropy Reduction Techniques As Applied To Remote Sensing Spacecraft Communication Systems

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Abstract:

In this paper the work being done at Raytheon-Santa Barbara Remote Sensing (SBRS) in the area of entropy reduction of remote sensing data on the National Polar-Orbiting Operational Environmental Satellite System (NPOESS)

Visible/Infrared Imager/Radiometer Suite (VIIRS) instrument is described. The VIIRS instrument will produce the largest amount of data on the NPOESS satellite platform, and thus has the greatest impact on data rate. The VIIRS instrument produces 22 bands of radiometric and imaging data, which must be transmitted to the spacecraft without loss of data integrity. The RICE algorithm is implemented in the VIIRS instrument in order to provide lossless data compression. This paper will describe the spectral subtraction data compression techniques that were implemented in order to reduce the entropy going to the RICE compression engine in the VIIRS instrument, and the subsequent reduction in data rate. Also, described in the paper will be digital signal processing techniques that were used to provide an additional reduction in data rate. This paper will also describe the VIIRS implementation of the Fault Tolerant 1394 data network that utilizes the 1394 ASIC chipset developed by the NPOESS Integrated Program Office (IPO,) and Northrop Grumman Space and Technology (NGST.) This high-speed network has facilitated the reliable transmission of large amounts of compressed and uncompressed science and telemetry data from the VIIRS instrument to the NPOESS spacecraft.